**Diffusion Through a Semi-Permeable Membrane**

**Purpose:**

1. Student should be able to define diffusion, osmosis, selective permeability, osmotic pressure, active and passive transport, concentration gradient, hypertonic solution, isotonic solution, hypotonic solution, crenation, and hemolysis.

2. Student will understand the relationship between rate of diffusion and molecular weight, and between selective permeability and molecule size.

3. Student should be able to state all reagents used and their purposes.

4. Students should be able to explain all experimental results. For example, give reasons for weight gain in some sacs but not all.

**Procedure:**

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| 1. Obtain one dialysis bag (bags are pre-cut and soaking in water in a beaker). Tie off one end as demonstrated by your instructor. Be careful not to pull too tight as this might tear the bag, but be sure it is very secure.  If the bag dries, wet it again and rub (gently) it between your index and thumb to open the other end.  (This can be tricky - the key is PATIENCE). |
| 1. Fill a small test tube with 5 ml of the solution assigned to you. Carefully slide the dialysis bag over the test tube and invert. [Close the opened end by tying it](http://www.usi.edu/science/biology/mkhopper/hopper/BIOL2401/LABUNIT1/01Ex5CellTransp/CellTransport%20Images/preparedbag.jpg) with string (again, be sure it is secure and there are no leaks).  Rinse off any excess solution on the outside of the bag and pat dry with paper towels. |
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| 1. Once all bags have been patted dry, [**weigh each one**](http://www.usi.edu/science/biology/mkhopper/hopper/BIOL2401/LABUNIT1/01Ex5CellTransp/CellTransport%20Images/weighbag.jpg) using the top loading balance. Use the **TARE** button to reset the balance.  Each of the laboratory tables have a balance. If you do not have one at your table, simply walk over to a table that does and weigh all your bags.  **Be sure to record the weight of each bag in table 1).** |
| 1. Obtain and **label** a beaker according to the soln. assigned to you.  Place the prepared dialysis bag into the beaker. |
| 1. Add the appropriate solution as designated by table 1.  [**Add enough solution until the bag is completely submerged**](http://www.usi.edu/science/biology/mkhopper/hopper/BIOL2401/LABUNIT1/01Ex5CellTransp/CellTransport%20Images/baginbeaker.jpg). |
| 1. Leave bags in beakers for 45 minutes.  Clean up your surrounding area. 2. LECTURE WILL RESUME DURING THIS TIME |
| 10. At the end of the 45 minute period, remove YOUR bag and pat dry to remove excess water.  Weigh the bag and record the weight in the appropriate box in table 1. **Did all the bag maintain their weight?  Why?  or Why not?**  **DO NOT discard the water in the beakers.**  They will be tested using the procedure below  **If you have solutions 1, 2, or 3 continue with the following procedure:**  **If you have solutions 4 , 5 or 6 proceed to question 5**  . |
| 1. Each group should obtain 2 test tube, a test tube rack or beaker, sharpie marker (found at instructor's desk), and testing reagent that corresponds to the solution you are testing. Label one test tube with the name of the solution in your bag and label the other test tube with the name of the solution in your beaker. |
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| 1. Take the dialysis bag containing your solution and carefully remove the string from one end.  Carefully invert your contents into the appropriate labeled test tube. |
| 1. Take 10 ml of solution from the beaker that your dialysis sac soaked in and transfer to the other test tube. 2. Using table 1 as a guide line, add the appropriate reagent to test for solute. |
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**Conclusion Questions:** On a separate piece of paper, use complete sentences to record you answer>

* 1. Did all the bags maintain their weight?  Why?  or Why not?
  2. Refer to the data obtained in beaker one:
     1. Did the test tube with the dialysis tubing contents indicate the presence of glucose? How do you know?
     2. Did the test tube with the fluid from the beaker (soaking fluid) contain glucose? How do you know?
     3. If the beaker fluid contained glucose, how did this happen?
  3. Refer to the data obtained in beaker 2:
     1. Did the test tube with the dialysis contents indicate the presence of NaCl? How do you know?
     2. Did the test tube with the fluid from the beaker (soaking fluid) contain NaCl? How do you know?
     3. If the beaker fluid contained NaCl, how did this happen?
  4. Refer to the data obtained in beaker 3:
     1. Did the test tube with the dialysis contents indicate the presence of Starch? How do you know?
     2. Did the test tube with the fluid from the beaker (soaking fluid) contain Starch? How do you know?
     3. If the beaker fluid contained did not contain Starch, why did this happen?
  5. What was the result of the test in beaker 4 and beaker 5? Explain the results. Why did these results occur?
  6. What was the purpose of placing a dialysis bag containing 40% dextrose in a beaker of 40% dextrose?  Do you need to test any of the contents (in the beaker and/or bag)?  Why or Why not?  Was there a significant change in the weight of the bag after the 45 minute period?  Can you explain?